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An Integrated Core Competence Evaluation Framework for Portfolio Management in the Oil Industry

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Abstract

The proponents of resource-based theory argue that efficient management of core competence portfolio provides sustainable competitive advantages. However, literature demonstrates little evidence regarding (i) how to identify core competence, specifically for a company operating in the oil sector, (ii) how to identify tangible and intangible resources related to the core competence of the company, and (iii) how to manage a company's competence portfolio more efficiently by forging network alliances with collaborating firms. Drawing upon resource-based theory this paper presents a core competence evaluation framework for managing the competence portfolio of an oil company. The paper introduces a network typology to illustrate how to form different types of strategic alliance relations with partnering firms to manage and grow the competence portfolio. The framework is tested using a case study approach involving face-to-face structured interviews with twenty-five divisional managers of a large oil company in the Middle East. We identified *purchasing*, *refining* and *sales and marketing* as strong candidates to be the core competencies of the company. However, despite the company's core business of refining oil, the core competencies were identified to be their *research and development* and *performance management* (PM) capabilities. We further provide a procedure to determine different kinds of physical, intellectual and cultural resources making a dominant impact on company's competence portfolio. In addition, we provide a comprehensive set of guidelines on how to develop core competence further by forging a partnership alliance choosing an appropriate *network* topology. The paper makes many contributions to the field of strategic management and core competence evaluation in the oil sector. The guidelines provided can assist practitioners with devising appropriate network relationships with partnering companies in order to outsource, divest, protect and/or develop their core competence portfolio.

Keywords: competence portfolio; resource-based view; resource-asset-capability; core competence; network topology; collective learning.

Introduction

To succeed in today's knowledge economy, companies need to fully understand their competence portfolio (Derwik and Hellström, 2017; Korytkowski, 2017; Parry et al., 2010). The notion of core competencies forms an important aspect of the resource-based view of the firm (Gupta et al., 2018; Mejri et al., 2018; Schumpeter, 2013; Penrose, 2000), which was recognised by scholars as early as the 1950s (e.g., Penrose, 1959); however, Prahalad and Hamel (1990) advocate core competencies as a way of rethinking corporate business portfolios to achieve competitive advantage. By leveraging unique resources and capabilities, companies can utilise their strengths to gain sustainable competitive advantage (King and Zeithaml, 2001; Lei, Hitt, and Bettis, 1996). Core competencies, considered the crown jewels of a company (Hafeez et al., 2002a/b/c), should be carefully nurtured and developed, as the core competencies' strength can determine companies' future business directions (Chursin and Tyulin, 2018; Yang, 2015; Porter, 1986). Hence, the analysis of core competencies becomes imperative as the results can be used to help a company to make more informed strategic management decisions regarding capability development, outsourcing, focusing, or diversification, in relation to new products, services, or markets (Urciuoli et al., 2014; Amiri et al., 2009; Newbert, 2007; Shee, 2006; Meyer, 1991).

Although the concepts of a resource-based view of the firm (Barney, 1991) and core competence as a firm strategy to gain competitive advantage (Snchez, 1995; Prahalad and Hamel, 1990) have been discussed for many decades, there are limited studies that illustrate how to manage a core competence portfolio in an integrated fashion (Mahdi et al., 2018; Derwik and Hellström, 2017). In addition, our literature review suggests that it is very difficult to distinguish between resources, capabilities and competencies. Phrases such as firm resources, knowledge, capabilities, strategic assets, and core competencies have been

used arbitrarily, loosely, and interchangeable (Löfstedt, 2001; Nanda, 1996; Hall, 1989). This has caused confusion, particularly to those firms that are embarking on business planning based on core competence theory (Hamel, 1994). Also, earlier research primarily focuses on core competence identification in the context of manufacturing companies (see for example, Hafeez et al., 2007a/b; 2002a/b). There is a need to address the question of core competence portfolio management in the process industry, such as oil, gas, and pharmaceuticals as the key capability resources and their context of tangibility may be profoundly different, especially while defining the key resources and capabilities matrix (Legenvre and Gualandris, 2018).

In order to address the above issues and to create a more general classification of core competencies so that they can be managed in a more integrated and systematic fashion, this study builds upon and extends Hafeez et al.'s framework (2007a/b; 2002a/b) to provide not only definitions of the salient characteristics of the key concepts, but also to develop a structured method for the evaluation of the core competencies of a company belonging to the process industry. Specifically, this paper has three novel aims. Firstly, we present a core competence evaluation framework (CCEF) using concepts of assets, resources, and their desired attributes of capabilities in the context of the process industry. The framework is subsequently tested by conducting face-to-face, structured interviews with the management of a large oil company. Secondly, we provide a procedure to close the loop. That is how to identify the tangible and intangible assets that make up these core competencies. This would allow the management of a company to invest further in those resources that are responsible for providing sustainable competitive advantages for the company. Thirdly, this paper introduces a strategic alliance typology and illustrates how to protect and further develop competencies, and how to manage non-core areas of the business in a strategic way.

the world's oil industry

The world's oil industry is arguably the single largest revenue sector compared with all other sectors. The expansion and contraction of the world economy is directly related to the consumption of energy, for which oil is the single largest resource. Expectations for global economic growth remain unchanged at 3.3 percent for 2015, in line with growth in 2014 (OPEC Report, 2015). Global oil demand is seen growing at 1.18 mb/d in 2015, higher than in the previous year's growth of 0.96 mb/d and unchanged from the report. Total oil consumption is expected to increase in the second half of 2015, leading to a total oil demand of 92.50 mb/d for 2015 (OPEC Report, 2015). Recent reports suggest that global oil demand will continue to grow annually by 1.2% on average, and is estimated to reach 105 mb/d (Lukoil, 2013). The management of an oil company portfolio is multifaceted considering the complexity of the market, capital size and the revenue involved. Many strategic management decisions, in terms of exploring, partnering, and outsourcing, are relatively more technically sophisticated, as well as more capital intensive, compared with other industrial sectors. The management of oil companies, therefore, face significant challenges when undertaking key strategic decisions that are efficient in terms of value and time. We see no examples in the literature where the oil sector has been an area of investigation for core competence identification and management.

This paper makes many contributions to the existing literature. Firstly, the framework presented here is a comprehensive portfolio management framework that involves both the identification of core competencies, as well as management of the core competence portfolio. Secondly, this is the first example where the oil sector is the focus of attention for managing a core competence portfolio. Specifically, we test the framework using data collected from a major oil refinery to identify competence and core competencies for the company. We

demonstrate how operational characteristics such as *collectiveness* or *learning ability*, among various other capabilities, are evolved into unique competencies of the case company. We argue how strategic flexibility, in terms of *routine reorganisations* and *resource redeployment*, manifests itself to become core competence for the organisation.

Finally, we employ Laudon and Laudon's (1995) basic organisation structure to appraise four network typologies, namely, *operational network*, *knowledge network*, *tactical network*, and *strategic network*. We illustrate how the case company may be able to sustain, nurture, and further develop its core competencies and operational excellence by exploiting primary features of these networks in terms of enabling mechanisms; types of synergy; points of commitment; knowledge sharing; trust, and cultural influences. Examples are given for various strategic alliances or collaborative relationships that suit each network type. supply chain management; project based joint-ventures; outsourcing using ad hoc pool arrangements, and full-blown joint ventures or consortia bonds.

Literature Review

The topic of how core capability can be developed and how it impacts on company performance has been the subject of study (Österlund, 1999). Researchers have stressed the importance of developing core capability frameworks that are conceptually and empirically applicable by practitioners in contexts extending beyond mere core competence identification (Ljungquist, 2007). Previously, scholars have analysed the development of knowledge competencies and knowledge reverse diffusion involved with repatriation of experts back to the company (Gudanowska et al., 2018; Heaslip et al., 2018; Lazarova and Tarique, 2005). Hafeez et al. (2002b; 2007b) employ the Analytic Hierarchy Process (AHP) to develop a core competence evaluation model and illustrate how strategic alliances can be formed for the

non-core activities of a firm using Lorange and Ross' (1992) strategic alliance framework for managing outsourcing of non-core activities. Based on Hafeez et al.'s (2002) framework, Kim and Kim (2013) employ AHP analysis to identify core competence strengths in the Korean water pump market to resolve the country's water purification problem. Lin and Wu (2014) explore the role of dynamic capabilities in evaluating firm performance; their results show that firm dynamic capabilities are able to mediate the firm's valuable, rare, inimitable, and non-substitutable (VRIN) resources to improve performance. Conversely, non-VRIN resources have an insignificant mediating effect (Lin and Wu, 2014)

Iles et al. (2010) identify method of competence development through human capital management. For them, the important characteristics of a *social capital* perspective are the kinds of networks and relationships that exist therein. For example, Lampel and Bhalla (2011) discuss different ways of developing network configurations and the impact of this through offshoring; their findings suggest that offshoring render firms' operational flexibility and cost efficiencies presents challenges in terms of the strategic alignment of core values and processes for the company. Beugelsdijk and Jindra (2018) and Mudamde and Swift (2011) explore ways of leveraging competencies in multinational enterprises (MNEs) using local companies' innovation networks. They argue that MNEs can access multiple sources of knowledge residing in diverse geographical locations through community of practice (Hafeez and Alghatas, 2006) that allows access to technological expertise and social networks for knowledge sharing (Hafeez and Alghatas, 2007; Hafeez and Abdelneguid, 2003).

Khan and Lew (2018) and Chand and Kaou (2012) analyse the key determinants of partner selection for a strategic alliance in a multi-country context. They conclude that alignment of nationality and culture are the key determinants of developing the alliance. Li

and Lee (2014) evaluate the impact of knowledge transfer to develop the capability of a subsidiary in the network using multiple sources, from (i) the parent company and (ii) using a peer company. They conclude that this speeds up the knowledge transfer and capability building process in comparison with using only one source. The study also points out that a focal subsidiary's entrepreneurial culture is a key element in determining the success of knowledge transfer processes within its MNC network. More recently, Hong and Snell (2015) discuss knowledge development through cooperation in the supply chain. They consider the case of knowledge co-creation between a foreign subsidiary and its local supplier. Pollitte et al. (2015) explore the ways in which knowledge acquisition and knowledge exploitation processes can occur between multiple partners to establish and exploit sustainable competitive advantages. Scott-Kennel and Giroud (2015) investigate the contribution of network knowledge and strategic orientation to firm-specific advantages (FSAs); they find significant and positive relationships between different types of FSAs and knowledge of the focal unit, knowledge of the internal corporate and external business networks, strategic orientation, and firm performance. Most recently, Salamat et al. (2018) provide a fuzzy possibilistic, Analytic Hierarchy Process (AHP) based approach for partner selection while considering developing strategic alliances. This approach can not only handle inconsistent data, but it can also allow for mitigating different kinds of associated risks while formulating a strategic alliance. However, this approach focuses upon finding an efficient method of partner selection and does not address evaluating core competencies and their associated tangible and intangible assets.

Our review indicates that the literature remains fragmented, perhaps due to the multifaceted and multidisciplinary nature of core competence concepts. A key framework driving the development of our more integrated approach to core competencies portfolio management

comes from Barney (1986), who identifies the conditions for a resource to offer sustained competitive advantage such as value, rarity, inimitability, and non-substitutability. In a practitioner-orientated article, Grant (1991) recognises that for a profit-generating sustainable capability to emerge, it must be durable, non-transparent (inimitable), non-transferable (immobile), nonreplicable, and appropriable; these factors are incorporated into this study's framework. These factors are not independent, but interrelate and inter-correlate since the value of a resource will decline if it becomes less scarce; a resource is less valuable and less scarce if it is easily imitable (Day, 1994). Amrit and Schoemaker (2012) argue that a firm achieves rent (see above note) due to its ability to make better use of its resources, rather than because it has better resources; this is the primary motivation for our framework. This study offers an integrated and more systematic approach, initially to identify core competence of a company in the oil sector, and then to provide a framework to manage its core competence portfolio.

Towards a Core Competence Evaluation Framework (CCEF)

Strategic Value and Characteristics of Firm Resources

Wernerfelt (1984) defines resources as 'anything, which could be thought of as a strength or weakness of a given firm'. Barney (1991) suggest that firm resources 'include all assets, capabilities, organisational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness'. David-West et al. (2018) and Nanda (1996) advocate that, 'resources are the fixed, firm-specific input factors of production'. These definitions differ from Amit and Schoemaker (2012) who define resources as 'transferable input factors of production'. Proponents of the resource-based view often define resources as the assets, knowledge, capabilities, and organisational processes that enable the firm to conceive and

implement strategic decisions. However, more recently a consistent view is emerging that resources may be tangible or intangible (Porter and Kramer, 2019). Intangible resources are identical to Itami's (1987) as invisible assets 'information based resources' such as consumer trust, corporate culture, and management skill (Itami, 1987). We believe soft skills and knowledge is an essential ingredient of intellectual resource. Also, in today's global economy, a firm does not need to own or control a tangible or intangible resource; rather, having access to a resource through customer and the parent organisation.

Based on our review, we define resources as the individual assets of the firm, for example, items of capital equipment, employee skills, patents, and brand names. In particular, we classify assets into three categories, namely: physical, cultural, and intellectual. *Physical resources* include plant equipment, production technology, financial endowments, location advantages, and raw materials. *Cultural resources* include the training, abilities, and experience possessed by organisation members (Milner et al., 2018). *Intellectual resources* include the firm image or reputation, internal systems for research, planning, motivation, and the processes or routines that support these systems (Hafeez et al., 2002a/b/c). Table 1 shows definitions and examples of firm resources.

Insert Table 1 about here

Firm Capabilities

Resources and capabilities are closely related terms; where a resource is a fixed asset, capability is the potential input from the resource stock to the production function. Grant (1991) defines capability as 'the capacity for a team of resources to perform some task or activity'. Capabilities are what the firm can do; they are the result of resources working

together to achieve productive tasks. For each business function, capabilities may be formed by the *integration* of multiple activities (processes) or developed just from single (discrete) activity (Klein and Hiscocks, 1994). Examples of discrete capabilities may include those dealing with individual activities or specialised tasks, such as polishing the surfaces of components or operating at checkout counters. These capabilities are relatively simple, however, large in number. While such capabilities may be indispensable to a business operation, on their own they have limited value to the firm. Authors have pointed out that such a capability is unlikely to qualify as a core competence (Brem and Elsner, 2018; Goddard, 1997; Teece et al., 1997; Henderson and Cockburn, 1994). Compared with discrete capabilities, integrated capabilities are fewer in number, and are more dexterous and valuable owing to the synergy of combining various discrete capabilities. While capabilities depend on the integration and application of the firm's human, cultural, and tangible resources (Hasan, 2018), it is through the application of capabilities that the firm also creates and augments its resource base (Kwak et al., 2018). In summary, there are the current and potential applications of resources. Table 2 gives some examples of functional or operational capabilities.

 Insert Table 2 about here

Firm Competence and Functional Integration

Generally, the more activities are involved, the more likely the capability is to be complex. Since integration is a characteristic of extensive communications and interactions among discrete capabilities, integrated capabilities are also known as *collective learning* (Alnawafleh et al., 2018; O'Donnell et al., 2018; Riley et al., 2018; Teece et al., 1997; Kogut

and Zander, 1992). An integrated capability may provide more flexible business options to a firm because of its richer context. Since integrated capabilities are relatively more complex, it is much harder for outside of the firm to understand and comprehend the capabilities possessed by a particular firm. Literature (Hafeez et al., 2007a ; Collis, 1994; Tampoe, 1994; Prahalad and Hamel, 1990; Stalk et al., 1992) recognises two characteristics associated with competence, namely, *collectiveness* and *uniqueness*. As mentioned earlier, like capability, a competence should be a capability that is integrated rather than discrete. It is the *collectiveness* nature that makes competence very valuable in strategic decision-making. Also, competencies themselves are ‘isolating mechanism’ (Heikkilä et al., 2018; Doz, 1997). Heikkilä et al. (2018) have identified some barriers preventing the firm’s competitors to imitate. Since these competencies cannot be quickly and evenly distributed across all competing firms, the competitive advantage afforded by these competencies is thus expected to be sustained for some time (Maury, 2018; Hall, 1994; Bharadwa et al., 1993; Dierickx and Cool, 1989). Based on our review, we define competence as a valuable capability, which is highly *collective* within a firm and *unique* in competition. A brief explanation of the terms *collectiveness* and *uniqueness* is given in the following section.

Collectiveness (or Integration) of Capabilities

We use three attributes to represent the *collectiveness* characteristic of competencies, namely, across-product, across-function, and across-business (Tian et al., 2018; Hafeez et al., 2002a/b/c; Leonard-Barton, 1992; Barney, 1991).

Across-product - Competences should not become *isolated*, special purposed capabilities, but the platform of multiple lines of products (Klein and Hiscocks, 1994); they should have the ability to deliver various product families and services and hence add value to the firm by integrating diverse assets and skills (Kogut and Zander, 1992). Canon is an example of this

approach, as their product development capability involves a meshing of three technologies: microelectronics, optics, and precision engineering. Canon's stream of new products involves the integration of these technologies.

Across-function - Competencies should be formed through integrated efforts from multiple teams or groups within a whole business function. A competence may be described as the artillery of capability networks of a function; its existence is critical to the excellence of functional operation. For example, Sony's design capability of small motors is formed through the joint efforts of its technical researchers and product developing engineers, and its existence makes the company's research and development (R&D) function distinctive among competing firms.

Across-business - Very often, a competence is an indispensable element of the business process that cuts horizontally across the functional areas of the firm; it can be seen as part of the identity of the firm. In fact, Prahalad and Hamel's 'core competence concept' has particularly emphasised the importance of cross-business competencies to a multi-business corporation (Prahalad and Hamel, 1990). Scholars believe that such capabilities are extremely useful for a firm to seek better integration options among Strategic Business Units (SBUs) (Amit and Schoemaker, 2012; Hafeez et al., 2010; Goddard, 1997; Klein and Hiscocks, 1994; Rumelt, 1994).

Insert Table 3 about here

Uniqueness

A unique capability could become an 'isolating mechanism', which is able to prevent competitors eroding the competitive edge created by a capability (Klein et al., 1998). To be rendered *unique*, a capability should demonstrate at least one of the following three attributes:

rareness in the marketplace, less imitable by competitors, and/or difficult to be substituted (Klein et al., 1998; Hamel, 1994; Barney, 1991).

Rareness - If one or more key capabilities are rare in the competition, a firm can base its value creating strategy upon these capabilities to sustain a competitive advantage. Being *rare* doesn't necessarily mean that a specific capability is only held by one competing firm.

Generally speaking, rareness is very often attributed to the following two factors: *Path Dependency* (i.e. the firm-specific experience); for example, House of Fraser's high quality retailing results from the operating experience of its long history, and *Asset Mass Deterrence* (i.e. the ability to accumulate necessary assets in time), such as BT's selling capability, which is largely dependent upon its dominant dealer networks in the UK (Barney, 1991; Reed and Defillippi, 1990; Dierickx and Cool, 1989).

Inimitability - Inimitability is the degree to which a firm's resources or capabilities cannot be duplicated or copied by its competitors (Ambrosius, 2018; Lippman and Rumelt, 1982). If a resource or capability is difficult to imitate, then it is likely to have extra value with regard to the competition. The more inimitable a resource or capability, the more likely it will maintain its superiority, and hence, value. For example, Sky's coverage of Premiership football, which began in 1992, changed the face of football coverage worldwide, and changed the rules of market competition entirely among its rivals.

Non-substitutability - Substitution is also a serious threat to the value of a capability (Saranga et al., 2018). As according to Dierickx and Cool (1989), the existence of substitutes means that the capability is no longer able to create distinctive value to customers. For example, Coca Cola cannot rely upon its fizzy drink technology to remain competitive, as all its rivals have access to very similar technology. In the vacuum cleaner market, Dyson

challenged the dominant position of Hoover and the like only by introducing a high quality revolutionary product, that is, vacuum cleaners with no bag. Substitution may happen in various ways, such as material change, technological development, process revolution, and methodology improvement (Doz, 1997). Table 4 summarises the attributes of uniqueness by giving some examples.

 Insert Table 4 about here

Core Competences and Strategic Flexibility

Academics assert that ‘being unique in competition’ is not sufficient for core competencies to keep their strategic values in the dynamic environment. This is because an inflexible *core competence* may quickly turn into tomorrow's *core rigidity* (Taba, 2018; Hafeez et al., 2007a; Teece et al., 1997; Leonard-Barton, 1992). Other scholars also suggest that a core competence may be ‘a competence, which is highly flexible in terms of creating new strategic options for future business in a dynamic environment’ (Klein et al., 1998). We agree that in order to identify core competence, the criteria should include some dynamic attributes. We thus define strategic flexibility as *the capacity of the capability to create new strategic options to respond to new demands in a dynamic competitive environment*. Strategic flexibility may include two attributes: resource redeployment and routine reorganisation. A description of these terms is given below.

Capability Redeployment - It is understood that if a company can manage to redeploy its capability, new strategic options may be created. For instance, Honda's experience in Formula One Racing has benefited its road production cars through the introduction of Formula One cars’ technology. The impact of the asset flexibility on competence may be examined from the following three perspectives: *range of alternative uses*, whereby the

resource redeployment ability of a competence is established if the underlined resources are deployed in a range of alternative uses; *switching costs and difficulty*, where the associated costs and complexity are lower, the assets can be switched for alternative applications, the competence will be more flexible, and, *opportunity cost of delay*, whereby the faster one or more of the assets can respond to business opportunity, the more flexible the competence (Amit and Schoemaker, 2012; Hafeez et al., 2002a; Sanchez, 1995; Dierickx and Cool, 1989).

Routines Reorganisation - As explained, capabilities, in essence, are the organisational routines that present solutions to a particular problem. While a routine may be valuable to a firm for a specific period of time, it may also ‘create an organisational inertia which limit's the organisation's ability to fully comprehend new signals from the environment and act upon them expediently’ (Hafeez et al., 2002b; Doz, 1997; Leonard-Barton, 1992). A valuable routine should be able to reorganise itself sporadically to exploit business opportunities. For example, Canon's product development competence is formed by a set of informal and less rigid routines. Where necessary, the company set up a taskforce that brings together employees from across the organisation to develop new products. Since the taskforce combines skills and knowledge within the company, and the development activities are managed and interacted flexibly, canon is able to deliver innovative and high quality products, such as cameras, image systems and copiers, to customers (Klein and Hiscocks, 1994; Stalk et al., 1992). Table 5 summarises the attributes of strategic flexibility by giving some examples.

Insert Table 5 about here

An Architecture for Core Competence in the Oil Industry

Based on the comprehensive review presented, and using the concepts of firm resource, capability, and competence, we propose a core competence evaluation architecture as illustrated in Figure 1 (Source: Hafeez et al., 2002a/b/c). The tangible and intangible resources are the inputs that form the capabilities of a firm. While all of the capabilities are useful to the firm's business, some capabilities play relatively more *valuable* roles in realising business objectives; these are the key capabilities of the firm. Note that only those key capabilities, which are relatively *unique* in competition and highly *collective* in business operation, are likely to become competence. As explained, the difference between competence and core competence is that the latter is relatively *strategically flexible* or dynamic by nature. In the subsequent sections, we test this framework by providing a detailed analysis, before developing a validated typology.

Insert Figure 1 about here

Methodology

Identifying Competence for an Oil Company

The case company investigated is regarded as one of the most efficient oil refineries in the world. The main outputs of the refinery comprise of different grades of petrol with different lead compositions, and are distributed throughout Europe. The refinery was commissioned in the 1960s and has since gone through a series of improvement programs to

increase its daily oil output by 75 percent, and doubled its coke production. The company has always been on the lookout for the most advanced technology and innovative techniques to ensure its ability to meet the increased requirement for low lead petrol, as dictated by many environmental sustainability agendas throughout Europe. Over the years, these investments have helped the refinery to maintain its enviable position.

The case study involved conducting face-to-face structured interviews with 25 divisional managers. The structured interviews entailed the completion of a questionnaire related to the core competence evaluation framework, as described by Hafeez et al. (2002a/c). A four-stage core competence evaluation procedure was adopted, as identified by Hafeez et al. (2002 a/c). For Stage 1, we conducted interviews in two rounds. In the first round, each of the divisional managers were asked to identify 10 of the firm's key capabilities according to their importance of 'value' to the company's strategic operation, and to prioritise them (by assigning them a 1 to 10 ranking). The data from the 25 participating managers was collated in a spreadsheet by assigning different rankings to the identified key capabilities.

Subsequently, the key capabilities were ranked using a normalisation method to identify five key capabilities that scored higher in the ranking. We also conducted a subsequent exercise in which the participants were asked to identify the contributions of physical assets, intellectual assets and cultural assets that make up these key capabilities. Each interview lasted between 1 to 2.3 hours. The data was recorded directly onto a spreadsheet model to reduce the analysis time.

Following Hafeez et al. (2007) and Hafeez and Essmael (2007), a more in-depth analysis was undertaken by utilising a structured questionnaire. At Stage 2, each participant

was asked initially to rank each of the five functional capabilities against the *collectiveness* attributes *across product*, *across-functions* and *across business-unit*. At Stage 3, respondents were asked to provide a ranking for these functions against the *uniqueness* of *rareness*, *inimitability*, and *non-substitutability*. The excel spreadsheet analysis of the combined responses provided the *competence* functions of the organisation. At Stage 4, respondents were asked to rank a reduced selection of *competence* functions to undergo the test of strategic flexibility and sustainability, again by collecting and collating responses in the spreadsheet model against the attributes of *resource redeployment* and *routines reorganisation*.

For the purpose of this research, we have introduced a new Stage 5 that concerns mapping the various strengths of the competence and core competence candidates against a network typology in order to protect or augment these competencies further through developing partnerships and/or other collaborative relationships with other organisations.

Results Analysis and Discussion

Assets Contribution

As described in the methodology section, at Stage 1 two sets of structured interviews were undertaken with each of the 25 divisional managers who participated in this study. These interviews identified concerned to identify and rank 10 key capabilities of the company believed to be most valuable to the company. Overall, 30 capabilities were identified, and the ranking process identified the five key functional capabilities of the company, namely, *purchasing*, *refining*, *sales and marketing*, *R&D*, and *performance management* (PM), which were deemed most valuable for the company. These five key functional capabilities are identified in Table 6.

One aspect of the analysis is to assess the key contribution of the three identified assets, namely, *physical*, *intellectual*, and *cultural*, which make up the individual capability of the company. The average results are given in Table 6. Results show that *refining* emerges as the top *physical* asset, scoring 49 percent. A refinery such as the case company has vast amounts of pumps, motors, and turbines. The raw materials, tools, and other physical assets are what make the refinery function. Grant (1991) states that ‘firm resources are the primary source of profit for the firm’, and this seems to be true for this case company. *R&D* scored 58 percent, as the top *intellectual* asset. *R&D* is about knowledge and expertise, and is therefore identified primarily as an intellectual asset. According to Grant (1991), ‘resources firstly provide the basic direction for a firm’s strategy’. From our discussion with the management it became apparent that over a number of years the case company has been heavily reliant upon its *R&D* competence to seek future directions. Finally, in the *cultural* asset category, *performance management* secured the top position with a 58 percent contribution. From subsequent discussion, it was clear that the management understood *performance management* as beliefs, values and attitudes, and they are successful in conveying this message throughout the company.

Insert Table 6 about here

Uniqueness of Assets

Our analysis reveals that physical assets ranked slightly higher on the *rareness* scale (Table 7). An example of a physical asset is the location of the refinery, as it is situated directly on major road and rail networks, as well as being accessible by sea. However, it is

the cultural assets that score highly on *rareness* and *non-substitutability*. Moreover, cultural assets are ranked top for all of the three attributes of uniqueness; this suggests that the company values their cultural assets more highly as contributory factors to their business operations when compared with physical and intellectual assets.

Insert Table 7 about here

Collectiveness of Capabilities

As evinced by the total score in Table 8, the key capabilities that are regarded as relatively integrated are *refining*, *performance management* and *purchasing*. These capabilities seems central to the company's main operation, and interact with all of its key business functions and departments. *R&D* scored more highly than *sales and marketing*; perhaps due to stable demand, *sales and marketing* is deemed not to be making much impact on business operations. However, we feel that the company could benefit from integrating *sales and marketing*, especially with *purchasing* and *refining* (production).

Insert Table 8 about here

Uniqueness of Capabilities

Table 9 gives scores for the three uniqueness attributes for each key capability. The table shows that the company regards *refining*, *performance management*, and *R&D* as relatively unique key capabilities. With regards to *refining*, uniqueness may be translated in terms of its

physical assets, as well as *intellectual* assets, as identified in Table 6. Specifically, plant location and investment in new technology give the company a *rare* position when compared with the competition? With regards to *R&D*, specialist skills, knowledge of the refining process and understanding the chemistry required to translate its main outputs into by-products, is highly dependent upon the company's intellectual assets. Also, *performance management*, as identified earlier, borrows much from the cultural assets of the company. It is also interesting to note that the main output of the company – *refining* – scores higher than *performance management* and *R&D*. Note that two of these capabilities (*refining* and *performance management*) are also regarded as highly collective, and therefore become prime candidates for consideration as core competencies.

 Insert Table 9 about here

Core Competence for Company A

Scores for the strategic flexibility constructs, namely, resource redeployment and routine reorganisation, are provided in Table 10. It is interesting to note that *R&D* and *performance management* score relatively higher on the strategic flexibility indices. One apparent reason is that these two activities significantly from the intellectual and cultural assets of the organisation. Compared with the physical assets, these non-tangible assets are relatively easy to adapt when compared with *refining*, where rigid plant structure restricts the main operation to narrowly confined options for product range or diversification.

 Insert Table 10 about here

The tabular results are represented in a graphically form in a two dimensional matrix (Hafeez et al., 2002a/b/c), as shown in Figure 2. The pictorial format illustrates that where

R&D and *performance management* fall into a core competence category, *refining*, *purchasing*, and *sales and marketing* are not falling far behind when compared with the measurements for strategic flexibility. These results were verified by the management of the company, who agree with our assessment, stating that these results are in-line with the company's overall view of the company as their mission statement claims 'flexibility and innovation are the hallmarks of the refinery'.

Insert Figure 2 about here

Nevertheless, the results of the above assessment should not be accepted blindly, that the results dispense with the fact that the main operations of the company are oil production and refinery; outsourcing these operations would change the company into an entirely virtual business, which would not be sustainable. However, the analysis could inform the management of the company of ways in which some elements of flexibility could be introduced.

In the subsequent section, we introduce Laudon and Laudon's (1995) organisation structure to appraise four network typologies: *operational network*, *knowledge network*, *tactical network*, and *strategic network*. We define primary features of these networks and illustrate how the case company may be able to sustain, nurture, and further develop its core competencies and operational excellence by exploiting collaborative opportunities offered by these structures.

A Typology of the Network Structures

In order to remain competitive and adaptive to the fast changing global market, many organisations have adopted newer organisational forms (Jarvenpaa and Ives, 1994; Drucker, 1988). Network organisations have been hailed as the new competition (Newbert, 2007), the third organisational form (Best, 1990), and organisational form for the information age (Li et al., 2016; Lipnack and Stamps, 1997). These efforts are a reflection of organisations' desires to move away from the Fordist model of vertical integration in order to introduce more adaptability and flexibility in operations to suit the new demands of the knowledge economy. Sub-contracting is used increasingly as a way to mitigate investment failure by large organisations (Mouritsen, 1999). During 1990s this led to the trend of extravagant outsourcing in order to reduce costs and increase the operational efficiency of value chains (Chan et al., 1997).

However, despite frequent citations in the literature, a general framework to describe the anatomy of network organisations is yet to appear (Nassimbeni, 1998; Cravens et al., 1996). Existing models are either too complicated, or too superficial to provide management with the appropriate rationale when seeking a collaborative relationship. Despite its formal boundaries, we find Laudon and Laudon's (1995) model describing vertical coordination mechanisms particularly helpful in this regard. With this model, the executive plans the firm's strategy; middle management supervise and co-ordinate business activities in order to achieve the desired strategy (Hafeez et al., 2006); knowledge and data workers use expertise to design products, processes and services (Hafeez and Abdelmeguid, 2003), and production and service workers deal with day-to-day production and service activities (Shafiq et al., 2017; Hafeez and Arawi, 2013). All of these functions cut across various business functions within the company (see Figure 3).

When entering into some kind of external relationship, organisations need to be aware of a complex set of interdependencies, each of which demands a different type of co-ordination effort. This particularly applies when the relationship remains detached at the geographical, cultural, legal, or even organisational level. Mintzberg (1998) postulates four main kinds of interdependence: *interdependencies in workflow*, *interdependencies in processes*, *interdependencies of scale*, and *social interdependencies*. Mintzberg (1983) also suggests that the differences in the nature of the interdependencies are translated into the main co-ordination mechanisms, such as, *direct supervision*, *standardisation of input/output, processes and skills*, and *mutual adjustment*. Using the concepts of Laudon and Laudon, (1995) and Mintzberg (1983), we propose four different network typologies, as illustrated in Figure 3, explained briefly in the following subsections.

Insert Figure 3 about here

Operational Network

The operational network allows the creation of operational synergies between two organisations (Schonsleben, 2000; Jarillo, 1988) while focusing on material flow (Hafeez et al., 2010). In its most simplistic form, this network constitutes a kind of short-term supply relationship. Traditionally, such collaborations may be developed by the staff servicing the purchase departments of the two organisations. Ordinarily, these relationships would not go beyond keeping formal contact at the departmental level, which provides very limited scope for trust building and knowledge sharing opportunities. An organisation acts as a client (or contractor) to receive (or supply) raw materials, semi-finished goods, or even the finished product and/or service. Operational networks can benefit by moving into supply chain

management or partnership sourcing relationships (Al-Qatawneh and Hafeez, 2015; Hafeez, et al., 2010; Keoy et al., 2007); this would allow longer-term involvement between the partner organisations and offer opportunities for improving operational performance.

Knowledge Network

The main strength of a knowledge network is to facilitate knowledge sharing opportunities (Inkpen, 1996) at the intra or inter-organisation or functional levels (e.g. between marketing, R&D, distribution functions, etc.). Therefore, forming such networks would facilitate skill and expertise flow amongst the partnering organisations. There are examples that joint venture type arrangements have become a popular mode for sharing resources. This network allows an opportunity to learn, often by acquiring the alliance partner's skills and capabilities (Hafeez and Aburawi, 2013; Hafeez and Alghatas, 2007a; Inkpen, 1996). Consequently, the main enablers involved in this collaborative relationship are the *knowledge workers*. Type of network relationship would most benefit 'knowledge intensive' companies such as consulting companies, as well as public sector organisations such as the National Health Service (NHS) in the UK (Hussain and Hafeez, 2008a/b).

Tactical Network

With a tactical network, middle management are usually the key enablers in developing collaboration (Jarvenpaa and Ives, 1994; Drucker, 1988), if any. The main impetus tactical network is to achieve synergies amongst network participants by focusing only on the outputs (Hafeez et al., 2006a/b). Non-core activities, such as cleaning, catering, and facilities management, are outsourced to the network participants to minimise the costs and difficulties of managing them. As a result, relationships are usually detached, hardly allowing for any exchange of expertise. Middle management typically assumes the

responsibility of managing these contracts, whereas, top management assumes only an advisory role.

Strategic Network

A strategic network is the most suitable network type for exploiting competence synergies? An organisation can detect rapid changes in the social and industrial climate, and try to meet new challenges by quickly developing new products and/or services using the competencies of a partnering organisation. A strategic network demands high levels of trust and the flow of expertise and knowledge. Close cooperation demands high levels of intra-departmental and inter-organisational communications cutting across the vertical as well horizontal levels of the network. In terms of the various modes of formal entry, consortia bonds as strategic alliance arrangements have become increasingly popular as they are often an efficient way of handling environmental uncertainty in a foreign location (Hafeez et al., 2010; Beamish and Banks, 1987). A number of financial sector and pharmaceutical sector alliances are the best examples of where collaborations began as a strategic network.

Managing the Competence Portfolio for Oil Company A

Figure 3 highlights a number of operational excellence strategies using the proposed network typologies. For example, using the operational network typology, Company A may benefit from opting for partnership sourcing or supply chain arrangements with its key partners to achieve material flow synergies; this would create opportunities to further develop *purchasing* competence and *sales and marketing* capability. Business benefits would accrue in terms of cost reduction and improved efficiency and this arrangement would permit a low to medium increase in *trust* and *knowledge sharing* opportunities, which are non-existent with the current arrangement.

With regards to *refining* competence, Company A must maintain its superiority in terms of its expertise and look for ways to introduce flexibility in its technology. A project based short-term *joint venture* with a cutting edge organisation could allow such an opportunity to access the required expertise and technology. An arrangement of this kind usually demands a greater commitment from individuals, requiring formal and informal interactions. Another avenue for *knowledge network* exploitation refers to the *R&D* core competence, in terms of testing for new technologies or developing new products without giving too much away.

Company A can subcontract some of its non-core functions and non-essential activities using tactical network arrangements, which are less demanding to manage when compared with a knowledge network. Company A might like to exploit its *performance management* expertise by becoming involved in some long-term joint ventures with potential for expansion opportunities. Also, *R&D* work can be further exploited to investigate opportunities for diversification. However, compared with all other network types, a tactical network would be extremely demanding, requiring considerably more employee and management attention in order for the company to reap real benefits.

The results of the analysis were shared with the management of company A who fully approved the core competence identification results; however, in terms of portfolio management, they accepted the theoretical findings and agreed to take this as the basis for boardroom discussions.

Theoretical Contributions and Managerial Implications

The research presented here addresses the knowledge gap that pertains to methods for evaluating core competence for an oil processing company. By its nature, the oil industry is capital and knowledge intensive; the oil market is very complex due to fluctuations in oil prices subject to uncertainty in oil demand, and geo-political situations. Consequently, investment decisions are decidedly risky and the ramifications of any wrong decisions are costly. Under the circumstances, the provision of a decision-making tool and a set of guidelines that can assist with the management of an oil company to cope with such challenges has enormous benefits. This research focuses on managing an oil company portfolio through the lens of a resource-based view of the firm, as proposed by Barney (1992), in that the research identifies the tangible and intangible resources in the context of a process industry, and illustrates the ways in which these resources can lead to developing the key capabilities of the company. Further, the research illustrates how these capabilities can be evaluated across functions, across products and across business units to become candidates for competence (Hamel and Parahalad, 1991).

From a dynamic capability perspective (Teece et al., 1997), the researchers identify a framework for the evaluation of the company's core competencies. Closing the loop by identifying the tangible (physical) and intangible assets (i.e. intellectual and cultural) that make up core competence is one of the major contributions of this research; this is of great consequence to the management of the company in ensuring appropriate investment decisions are made to strengthen these resources, thus protecting and nurturing key capabilities to ensure a sustainable competitive advantage (Hafeez, 2002a; 2010). Furthermore, the

company may decide to use these results to outsource capabilities that are either weak or not valuable to the company in future business operations.

Most of the previous work describes the ways in which to evaluate the key capabilities and core competence for companies excluding oil/production companies (see Javaidan et al., 2017; Hafeez and Essmail, 2007; Hafeez et al., 2002a/b/c). The present work contributes to strategic management theory and practice further by providing a network topology to indicate the ways in which a competence portfolio can be further strengthened externally by engaging in a collaborative venture. In particular, the network topology introduced here provides comprehensive guidelines for the management of a company by mapping the key assets of a business in line with its core competence. In addition, the topology maps out the ways in which to exploit the key assets to forge an appropriate collaborative relationship with a partnering company. For example, in order to further develop the *R&D* core competence for the case company, it is necessary to acquire more knowledge and expertise in *refining*, therefore a collaborative partnership focus on *knowledge flow* in and out of the organisation, and a meaningful collaboration between knowledge workers and data workers of the two companies. The network topology indicates that a high level of knowledge sharing is only possible by building a high level of *trust* amongst the collaborative partners. Therefore, a *joint venture* network arrangement is suggested, which would ensure the right level of communication and protect the ownership of intellectual property developed through the *R&D* competence; this would allow both partners to exploit the benefits from the new venture in appropriate proportions.

The research expands upon existing literature by presenting a framework for the management of an oil company's core competencies portfolio. The research contributes in

many ways to the strategic management field by merging contemporary views from knowledge management, community of practice, supply chain management, and network organisations. The comprehensive portfolio management tool presented within this study has major implications for the profession as it will enable the effective and efficient management of a core competencies portfolio in practice.

Future Study and Limitations

Where using case studies has its strengths in terms of assessing the suitability of a methodology in a specialist or narrow domain, there are also limitations in terms of generalising the outcome of the research. In addition, despite every effort to collect a representative view of the organisation by averaging the individual responses, the data collection process is prone to subjective bias. Similar to other interview based research, subjective bias could arise due to over confidence of individuals regarding their own performance or capabilities, or due to game-playing behaviour or politics within the organisation. We suggest utilising an AHP based analysis (Hafeez et al., 2007; 2002b) to remove any inconsistencies in the data and to conduct triangulation of the analysis. One of the challenges in triangulation of the data would be access to senior management, as this would require a minimum of four interviews, each with a one-hour duration, from each respondent, in order to collect the required data.

As explained, Salamat et al. (2018) provide a fuzzy possibilistic Analytic Hierarchy Process (AHP) based approach for partner selection when considering the development of strategic alliances. In future could be to develop a fuzzy possibilistic AHP approach for the selection of network topologies as introduced in this paper, this would reduce the inconsistency in subjective information and would lessen the subjective bias.

Finally, the framework needs to be implemented on a larger sample to achieve a consensus of whether the three core competencies identified are a typical representation of the sector.

Conclusions

This paper develops an integrated core competence identification and portfolio management framework that offers practicing managers guidelines on the ways in which to manage a core competence portfolio; this is the first time such a framework has been tested to identify and manage the core competencies of an oil company. We illustrate that core competence is a producer of operational excellence and collective learning manifested in across-products, across functions, and across business units. Also, core competence is flexible in terms of resource redeployment and routine reorganisations to meet ever-changing market demand. We have explain a step-by-step approach to the evaluation of core competencies using the data from an oil processing company. The results show that in spite of *refining* being the prime business activity (for an oil company), the core competencies that emerge are *performance management* and *R&D*, belonging to the *cultural* and *intellectual* assets categories, respectively. Our assessment shows that introducing flexibility in *refining* operations (and technology) may be the key factor for the company to sustain its competitive advantage. However, in order to nurture *performance management* and *R&D* core competencies, the management need to invest in the *cultural* and *intellectual* assets of the company. Finally, by introducing four network typologies, we illustrate the ways in which Company A may exploit various collaborative arrangements to enhance its operational excellence by managing its competence portfolio. The framework uses intellectual, cultural, and physical assets as the basic units of analysis and illustrates how strategic tangible and intangible resources may be employed to manage the competence portfolio of the oil

company. We argue that this framework is an integrated tool to identify not only the core competencies of the company, but also to manage the competence portfolio by engaging in a range of suitable activities that will enable the company company to retain and further develop its core competencies and to manage its non-core activities in more strategic and efficient ways.

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Table 1: Categories of firm resources

Term	Definition	Examples
Intellectual Assets	An intangible or 'invisible' resource	- House of Fraser's <i>reputation</i> of quality - Hugo Boss's <i>brand</i> name - Microsoft's <i>customer loyalty</i> - BP's <i>brand</i> name
Physical Assets	A tangible or 'touchable' resource	- McDonald's restaurants' <i>outlets</i> - Interflora's nation-wide <i>distribution</i> network - Shell's world-wide <i>distribution</i> network
Cultural Assets	A pattern of basic assumptions	- Virgin's <i>commitment</i> to customer service - Wal-Mart's <i>belief</i> in employees or 'associates'.

Table 2: Some examples of functional/operational capabilities

Functional/Operational Capabilities	Sub Capabilities	Examples
Design	New product design capability	Tetra Pak; Apple Computers
R&D	Research capability, new product development capability	IBM; 3M; Du Pont; Sony; Canon; Esso
Operations	Efficiency in volume manufacturing	Nucor; Shell
	Manufacturing flexibility	Texas Instruments
	Quality management	Hewlett-Packard; Toyota; Xerox
	Timely information communication	Gap; American Airlines
Sales and Distribution	Efficiency and speed of distribution	Wal-Mart
	Order processing efficiency	LL Bean

Table 3: Examples of the attributes of collectiveness

Collectiveness	Description	Examples
Across-function	The extent to which a capability is an indispensable element of one or more cross-functional processes	Nissan's <i>cost control</i> for its efficient logistics and production processes
Across-product	The extent to which a capability is shared by various products	Canon's <i>optical technology</i> used in image systems, copiers and cameras
Across-business	The extent to which a capability is an indispensable element of various business units	McDonald's <i>operations management</i> for its world-wide outlets

Table 4: Examples of the attributes of uniqueness

Attribute	Description	Examples
Rareness	The degree to which a particular capability is distinctive in competition	Ferrari's car <i>design</i> capability
Inimitability	The degree to which a particular capability is inimitable by competitors	Sky's Premiership football coverage, Sony's miniaturisation
Non-substitutability	The degree to which a particular capability cannot be replaced by other resources or capabilities	Dyson's no bag vacuum cleaners

Table 5: The attributes of strategic flexibility

Attribute	Description	Examples
Resource Redeployment	The ease with which baseline resources of a competence may be redeployed to develop new capabilities	Honda's Formula One <i>expertise and technology</i> has been re-deployed on their road cars
Routines Reorganization	The ease with which the manifested routines may be reorganised to support future business development	Celltech and 3M's <i>laboratory management</i> competence can be readily reorganised to develop new products

Table 6: Overall percentage contribution for Company A's assets

Capability	Overall Contribution					
	Physical Assets		Intellectual Assets		Cultural Assets	
	%	Rank	%	Rank	%	Rank
Purchasing	24	3	41	3	35	2
Refining	49	1	30	4	21	4
Sales & Marketing	26	2	49	2	25	3
R&D	22	4	58	1	20	5
Performance Management (PM)	15	5	27	5	58	1

Table 7: Overall scores for the attributes of uniqueness for Company A's assets (all scores out of 4)

Asset	Rareness		Inimitability		Non-substitutability	
	Score	Rank	Score	Rank	Score	Rank
Physical assets	2.6	2	2.4	1	2.4	2
Intellectual asset	2.2	3	2.2	2	2.4	2
Cultural asset	2.8	1	2.4	1	2.8	1

Table 8: Overall scores for the attributes of collectiveness for Company A's key capabilities (individual scores out of 4)

Key Capability	Across-function		Across-product		Across-business		Total (out of 12)
	Score	Rank	Score	Rank	Score	Rank	
Purchasing	2.6	3	2.6	2	2.8	2	8
Refining	2.8	2	3	1	3	1	8.8
Sales & Marketing	2.4	4	2.4	3	2.4	3	7.2
R&D	2.8	2	2.4	3	2.4	3	7.6
Performance Management	3.2	1	2.4	3	2.8	2	8.4

Table 9: Overall scores for the attributes of uniqueness for Company A's key capabilities (individual scores out of 4)

Key Capability	Rareness		Inimitability		Non-substitutability		Total (out of 12)
	Score	Rank	Score	Rank	Score	Rank	
Purchasing	3	3	2.2	4	2.4	5	7.6
Refining	3.8	1	3.4	1	3.6	1	10.8
Sales & Marketing	2.2	4	3	2	3	3	8.2
R&D	3.2	2	2.8	3	3.4	2	9.4
Performance Management	3.8	1	3	2	2.8	4	9.6

Table 10: Overall scores for the attributes of strategic flexibility for Company A's key capabilities (individual scores out of 4)

Key Capability	Resource Redeployment		Routine Reorganisation		Total (out of 8)
	Score	Rank	Score	Rank	
Purchasing	2.8	3	2.8	3	5.6
Refining	2.8	3	2.8	3	5.6
Sales & Marketing	2.8	3	2.8	3	5.6
R&D	3.4	1	3	2	6.4
PM	3.2	2	3.2	1	6.4

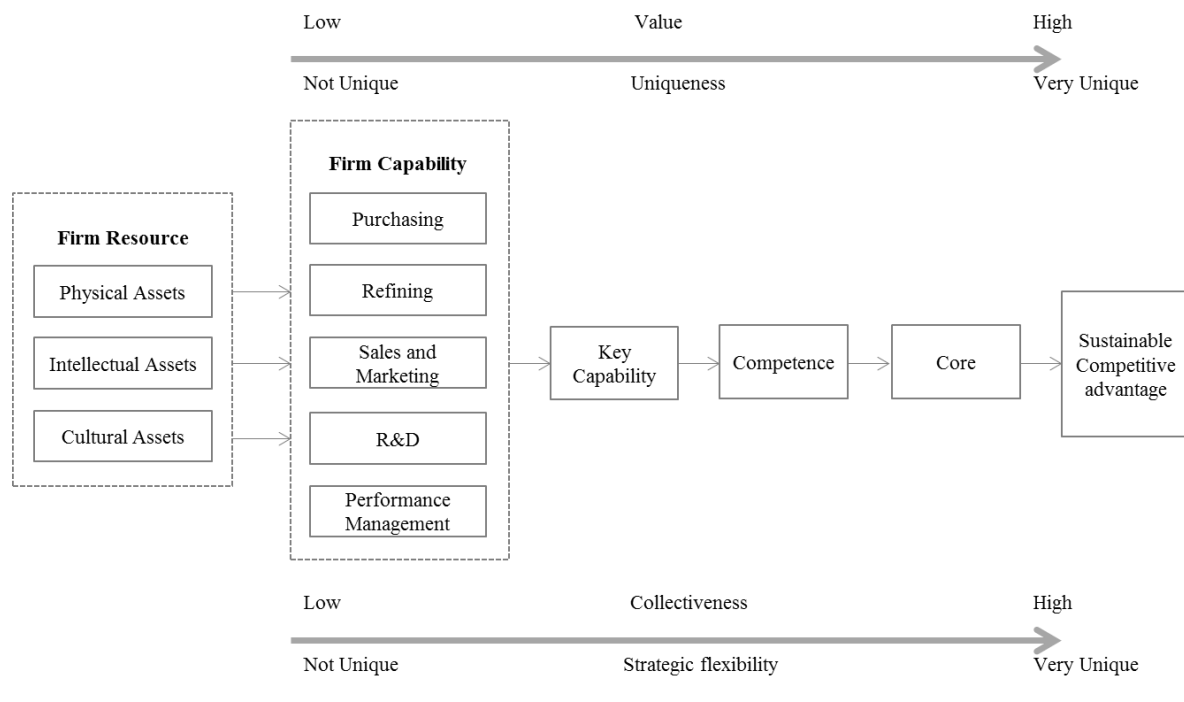


Figure 1: The Architecture of Core Competence (source: Hafeez et al., 2002a/b)

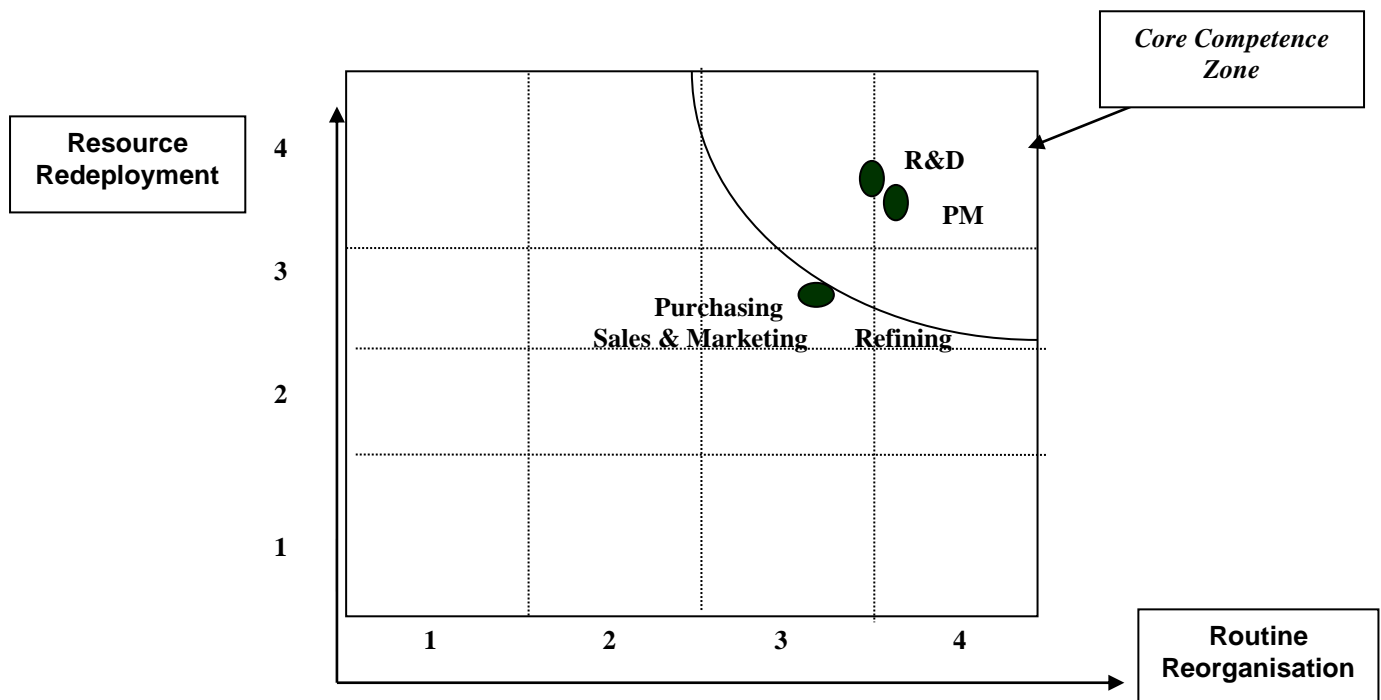


Figure 2: Core Competence Determination Matrix

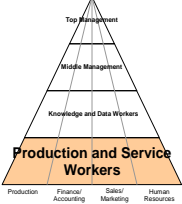
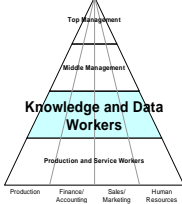
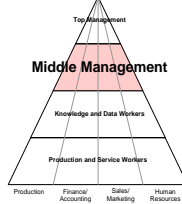

Primary features	OPERATIONAL NETWORK	KNOWLEDGE NETWORK	TACTICAL NETWORK	STRATEGIC NETWORK
Type of synergy	Operational	Knowledge	Tactical	Strategic
Main Focus	Material flow	Expertise flow	Activities flow	Competence
Main Enabler				
Type of Interdependency	Flow	Process	Scale	Capability/competence
Synergy achieved through Standardisation of	Operations	Skills	Outputs	Capabilities
Type of Relationships	Formal	Informal and formal	Formal	Informal and formal
Points of Commitment	Inter and intra-departmental level	Individual, inter and intra-departmental levels	Intra-organisation level	Individual, inter and intra-departmental; inter and intra-organisation levels
Knowledge Sharing	Low - Medium	Medium - High	Low	Medium - High
Trust	Low – Medium	Medium - High	Low	High
Cultural Influence	Low - Medium	Medium-High	Low	High
Example	Supply Chain	Joint-Venture	Outsourcing Ad hoc pool	Strategic Alliance (consortia bonds)
Operational Excellence Strategy for Company A	Sales and Marketing, Purchasing		Non-core assets and capabilities	Performance Management
Competence Development Strategy for Company A		Refining, R&D		R&D

Figure 3: A Typology of Network Organisations for Developing Core Competence